

REMARKS

Claims 1- 19 remain pending in this application with claims 1, 9, 11, 15, 17, 18 and 19 being amended by this response.

Claim 1 has been amended for purposes of clarification. Support for this amendment can be found throughout the specification and more specifically from Page 13, line 29 – Page 14, line 26. Thus, it is respectfully submitted that no new matter has been added.

Objection to Claims 9, 11, 15 and 17-19

Claims 9, 11, 15 and 17-19 are objected to for certain informalities. These claims have been amended in accordance with the comments of the Examiner to correct typographical and grammatical errors. Thus, it respectfully submitted that these objections are satisfied and should be withdrawn.

Rejection of Claims 1-6 under 35 U.S.C. 102 (b)

Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by “Hybrid Image Segmentation Using Watersheds and Fast Region Merging” by Haris et al.

The present claimed invention provides a method for fragmenting (F) images (14i) into homogeneous regions (Ri). The fragmentation (F) uses iterative merges of fragments F_i and F_j , among at least 3 fragments in the image, which are as similar as possible according to at least one selection parameter. The similarity is evaluated by a product $A*B$ of two factors A and B, A being consistent with a number of pixels relating to the fragments F_i and F_j and B being consistent with the selection parameter(s). A merge is performed when the product $A*B*C$ is less than a threshold consistent with the selection parameter, C being the inverse of the mean number of pixels per fragment, in the image.

Haris et al. neither disclose nor suggest a “fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image” as recited in claim 1 of the present invention. Additionally, Haris et al. neither disclose nor suggest “C being the inverse of a mean number of pixels per fragment, in the image” as recited in claim 1 of the present claimed invention.

Haris describes a multidimensional image segmentation algorithm which combines edge and region-based techniques through the morphological algorithm of watersheds. Haris utilizes an edge-preserving statistical noise reduction approach as a pre-processing stage in order to compute an accurate estimate of the image gradient. Specifically, Haris et al. describe the aggregate number of pixels within two fragments.

The present claimed invention encourages the merging of relatively small fragments (Page 14, lines 24-26). Specifically, “the test for stopping the fragmentation no longer corresponds to a specified number of fragments to be reached [(2)], but to an inter-fragment homogeneity threshold beyond which the merges no longer take place. Thus, as a function of the complexity of the image, the number of regions resulting from the segmentation of the image is variable” (Page 14, lines 17-23). The mean value of all of the regions is taken into account when merging each region.

Haris et al. are concerned with the value of pixels within two fragments for merging. Specifically, equation (12) on page 1689 is a function of the set of pixels of RM_i and RM_j and not any other partitions from RM_k . This is wholly unlike the present claimed invention which is concerned with the average number of pixels per fragment, in an image containing at least three fragments. Thus, while Haris et al. are concerned with the inverse number of pixels for two fragments, the present claimed invention is concerned with the inverse of a mean number of pixels of all (at least three) the fragments within the image. Therefore, Haris et al. neither disclose nor suggest a “fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image” as recited in claim 1 of the present invention.

The Office Action asserts that Haris et al. disclose the inverse of a mean number of pixels. The size of the fragments considered by the present claimed invention for the merging is taken into account relative to a mean size. The mean size includes the size of all the fragments within the image. The advantage of accounting for all the fragments within the image is to promote the merging of relatively small fragments – fragments that are small relative to the mean size of all fragments. Consequently, a homogeneous expansion in size of the fragments is favored during the merging or iterations.

As described above, Haris is concerned with a function (sum) of the set of pixels of RM_i and RM_j , but not of the other partitions of RM_k and consequently do not produce a mean value. This is wholly unlike the present claimed invention which weighs (divides) the parameters $A*B$ by the mean number of pixels per fragment ($1/C$), to get a decision parameter ($A*B*C$) for merging. Thus, Haris et al. neither disclose nor suggest “C being the inverse of the mean number of pixels per fragment, in the image” as recited in claim 1 of the present claimed invention.

As Claims 2-6 are dependent on Claim 1, it is respectfully submitted that these claims are allowable for the same reasons as independent claim 1. In view of the above remarks and amendments to the claims it is respectfully submitted that there is no 35 USC 112 compliant enabling disclosure in Haris et al. showing the above discussed features. It is thus further respectfully submitted that claims 1-6 are not anticipated by Haris et al. It is thus, further respectfully submitted that this rejection is satisfied and should be withdrawn.

Rejection of Claim 7 under 35 U.S.C. 103(a)

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haris et al. in view of Moed.

Moed, similarly to Haris, neither discloses nor suggests “fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image”

as recited in claim 1 of the present invention. Additionally, Moed neither discloses nor suggests “C being the inverse of a mean number of pixels per fragment, in the image” as recited in claim 1 of the present claimed invention.

Moed describes a system and method for extracting image information from a video frame for regions of the video frame that likely are objects of interest in a scene. An initial region set is generated by comparing luminance image information and color image information of a background image for the scene. A high confidence region set is generated comprising regions from the initial region based upon edge information of the regions and edge information in the background image. A final region set is generated by combining one or more regions in the high confidence region set if such combinations satisfy predetermined criteria, including size, region, proximity and morphological region dilation.

The Office Action asserts that Moed discloses an image segmentation system that operates on a color image. However, as discussed above, Moed, similarly to Haris et al., neither discloses nor suggests “fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image” as recited in claim 1 of the present invention. Additionally, Moed neither discloses nor suggests “C being the inverse of a mean number of pixels per fragment, in the image” as recited in claim 1 of the present claimed invention. As claim 7 is dependent on independent claim 1 it is respectfully submitted that claim 7 is allowable for the same reasons as claim 1.

In view of the above remarks and amendments to the claims it is respectfully submitted that there is no 35 USC 112 compliant enabling disclosure in Haris et al. and Moed, when taken alone or in combination showing the above discussed features. It is thus further respectfully submitted that claim 7 is patentable over Haris et al. or Moed when taken alone or in combination. It is thus, further respectfully submitted that this rejection is satisfied and should be withdrawn.

Rejection of Claims 8 and 19 under 35 U.S.C. 103(a)

Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schutz et al. ("Matching Error Based Criterion of Region Merging for Joint Motion Estimation and Segmentation Techniques") in view of Haris et al.

Schutz et al., similarly to Haris et al., neither disclose nor suggest "fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image" as recited in claim 1 of the present invention. Additionally, Schutz et al. neither disclose nor suggest "C being the inverse of a mean number of pixels per fragment, in the image" as recited in claim 1 of the present claimed invention.

Schutz et al. describe a method for merging regions for joint motion estimation and segmentation of digital video sequences. The region merging criterion is based on the measure of the matching error for a region when applying a previously estimated motion to it. A region adjacency graphs is used for data representation, which allows a scan independent processing and gives a high-level view.

The Office Action asserts that Schutz et al. disclose a method of grouping fragments of an image characterized in that the grouping uses a model of motion individual of each fragment F_i . However, as discussed above, Schutz et al., similarly to Haris et al., neither disclose nor suggest "fragmentation (F) using iterative merges of fragments F_i and F_j , among at least 3 fragments in the image" as recited in claim 1 of the present invention. Additionally, Schutz et al. neither disclose nor suggest "C being the inverse of a mean number of pixels per fragment, in the image" as recited in claim 1 of the present claimed invention. As claims 8 and 19 are dependent on claim 1, it is respectfully submitted that claims 8 and 19 are allowable for the same reasons as claim 1.

In view of the above remarks and amendments to the claims it is respectfully submitted that there is no 35 USC 112 compliant enabling disclosure in Haris et al. and Schutz et al., when taken alone or in combination showing the above discussed features. It is thus further respectfully submitted that claims 8 and 19 are patentable

over Haris et al. or Schutz et al., when taken alone or in combination. It is thus further respectfully submitted that this rejection is satisfied and should be withdrawn.

Claims 9-18 have been indicated as allowable. The applicant respectfully submits, in view of the above remarks that all rejections made by the Examiner have been satisfied and should be withdrawn. Therefore, the applicant respectfully submits that the present claimed invention is patentable.

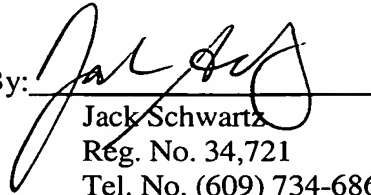
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No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account 07-0832.

Respectfully submitted,
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